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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/764,946
Filing Date: January 26, 2004
Appellant(s): ESPESETH ET AL.

John L. Rogitz #33549
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 6/27/06 appealing from the Office action mailed 6/1/06

(1) Real Party in interest

A statement identifying by name the real party interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct. Examiner withdraws the rejection of claims 4,14, because they are depended on the objected claims 3,12 respectively;

A correct statement of the status of the claims is as follows:

Claims 2,11 have been canceled.

Claims 1,5 are rejected.

Claims 3,4-6 are objected to.

Claims 7-10,12-18 are allowed.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is incorrect. Examiner has indicated the dependent claim 3 is objected to as being dependent upon a rejected base claim. Therefore, claim 3 should not be in the list of the appeal claims.

(8) Evidence Relied Upon

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clegg et al (US 6721845).

As in claim 1, Clegg describes a hard disk drive (HDD) comprising: at least one rotatable disk (disk); at least one data transfer element (Clegg's Fig 1A: read/write head); and at least one HDD controller controlling the data transfer element to execute commands in a queue (Clegg's Fig 1A represents a hard drive controller HDD; Clegg's column 3 lines 20-40, controller receiving multiple requests for data transfer in a queue, grouping these requests accordingly), at

least one command being selected for execution based on at least one of: an optimized throughput benefit (Cleggy's column 2 lines 25-30, advantageously write sequentially, lines 45-55 read sequentially), and an optimized operation rate benefit (Clegg 's column 2 line 67 to column 3 line 4, random reads); wherein the throughput benefit is determined based at least in part on a pipe length. Cleggy 's column 2 lines 25-30 clearly describe the advantage of writing sequential data records in sequential requests so that they fill the current cylinder before moving to the next cylinder. Cleggy does not expressly disclose using the term pipe-length. However, Cleggy's column 2 line 55 to column 3 teaches a method to improve the throughput by determining the requests have sequential addresses/data blocks. Each request requires a starting address and length or data blocks to be fetched. Cleggy further teaches by recognizing the sequential nature of these read requests, they can be fetched all together (fetching sequential data blocks on a disk). Furthermore, length or data blocks of each request must be used to determine the consecutiveness of these sequential read requests and to fetch corresponding data blocks in each request. Cleggy teaches by fetching these sequential requests together, the throughput of the system will be increased (see Cleggy's column 2 line 46-56).

Thus it would be obvious to one of ordinary skill in the art at the time of invention to include the fetching data blocks in sequential requests all together as taught by Cleggy. One skilled in the art would have been motivated to do so, because when fetching consecutive data blocks together as taught by Cleggy would eliminate overhead of the seek time (Cleggy's column 2 lines 27-30; 34-37 accessing sequential reads all together to minimize seek time) and allowing better overall data throughput in the system (see Cleggy's column 2 line 46-56).

As in claim 5, the claim recites wherein the operation rate benefit is determined based at least in part on a number of commands in a pipe. Claim 5 rejected based on the same rationale as in the rejection of claim 1. Clegg 's column 4 line 55 to column 5 line 23 further describes using a count of commands being received from host to determine the commands being operated in sequential mode or not.

Allowable Subject Matter

Claims 3,4,6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 7-10,12-18 contain allowable subject matter.

Response to Arguments

Applicant's arguments in response to the last office action has been fully considered but they are not persuasive. Examiner respectfully traverses Applicant's arguments for the following reasons:

A) Applicant argues that Cleggy does not teach the claim limitation of ".. wherein the throughput benefit is determined based at least in part of a pipe length".

Specification's pages 6-7 describes the throughput benefit, amount of data transfer per second (megabytes per second), is achieved by realizing the sequential data requests can be accessed all together with a data transfer size (i.e pipe length) as the total number of data blocks in these sequential commands. By accessing these sequential data blocks all together, the throughput will be benefited since the sequential data blocks on the disk will likely be in the same cylinder, therefore the seek time for these data blocks are greatly reduced or eliminated. In

another words, the benefit of the throughput is determined based on accessing theses sequential data blocks all together since total length of these sequential blocks are being accessed without the overhead of the seek time.

Specification's page 7 lines 1-8 shows a command or a request for accessing a chunk of data on the disk. The request is identified by a starting address and a length. The length is sequential data blocks being request for this request. In other words, length is the same word that indicates data blocks being requested, for example per each request. Because three sequential requests A, B, C together requesting data blocks in consecutive (i.e. sequentially data blocks 0-19), thus it's obviously to combine and to fetch these data blocks together to reduce overhead such as seek time.

Therefore the specification clearly defines pipe-length merely as a total number of data blocks for sequential commands being fetched together.

Cleggy's column 2 line 55 to column 3 in a similar manner, teaches a method to improve the throughput by determining the requests are for sequential data blocks. Each request must indicate a starting address and length or data blocks to be fetched. Cleggy further teaches by recognizing the sequential nature of these read requests, they can be fetched all together (fetching sequential data blocks on a disk). Furthermore, length or data blocks of each request must be used to determine the consecutiveness of these sequential read requests and to fetch corresponding data blocks in each request.

Cleggy teaches that by fetching these sequential requests together, the throughput of the system will be increased (see Cleggy's column 2 line 46-56).

Thus it's advantageously to access them all together without the overhead of the seek time (Cleggy's column 2 lines 27-30; 34-37 accessing sequential reads all together to minimize seek time). In other words, Cleggy teaches that by determining to access these data blocks all together, the throughput benefit is provided. The **length of the data blocks in these sequential commands** corresponding the pipe length in the claim. Similarly, Cleggy's column 4 lines 53-65 further describes circuits to check address and size (data blocks) of each requests and determining that they are sequential requests to be send to disk together.

B) Clegg 's column 2 line 67 to column 3 line 4 discloses a method to improve operation rate benefit, which by definition mainly to maximizing the number of I/O operation commands being issued per a time period. The goal of this optimizing scheme is to gain number of I/O operations per second, and not focusing on the sequential nature of data blocks being fetched. Thus this optimization is suitable for a workload with multiple random I/O requests. Clegg discloses that random read requests are distributed to different disks, so that data being retrieved on these disks are done in parallel and concurrently manner. Thus the number of I/O operations can be greatly increased.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Duc Doan

Duc Doan

Examiner

Art Unit 2188

Conferees:

9/8/06

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